L-4631-D
December 1992

MATERIAL SAFETY DATA SHEET

An explanation of the terms used herein may be found in OSHA 29 CFR 1910.1200, available from OSHA regional or area offices.
(Essentially similar to US Department of Labor Form OMB No. 1218-0072)
Do Not Duplicate This Form. Request an Original.

PRAXAIR

I. PRODUCT IDENTIFICATION

PRODUCT	Nitrogen		
CHEMICAL NAME	Nitrogen	**SYNONYMS**	Not applicable
FORMULA	N_2	**CHEMICAL FAMILY**	Not applicable
		MOLECULAR WEIGHT	28.01
TRADE NAME	Nitrogen		

II. HAZARDOUS INGREDIENTS

For mixtures of this product request the respective component Material Data Safety Sheets. See Section IX.

MATERIAL (CAS NO.)	Wt (%)	1992-1993 ACGIH TLV-TWA (OSHA-PEL)
Nitrogen (7727-37-9)	100	Simple asphyxiant (None currently established)

III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	-195.8°C (-320.46°F)	**FREEZING POINT**	-210°C (-345.8°F)
SPECIFIC GRAVITY (H_2O = 1)	1. Gas	**VAPOR PRESSURE AT 20°C.**	Gas
VAPOR DENSITY (air = 1)	0.967	**SOLUBILITY IN WATER, % by wt.**	Negligible
PERCENT VOLATILES BY VOLUME	100	**EVAPORATION RATE (Butyl acetate = 1)**	Not applicable

APPEARANCE AND ODOR Colorless, odorless gas at normal temperature and pressure.

EMERGENCY PHONE NUMBER

IN CASE OF EMERGENCIES involving this material, further information is available at all times:

Call CHEMTREC 800-424-9300 only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals. For routine information contact your supplier.

This product is subject to the Pennsylvania Worker and Community Right-To-Know Act (35 P.S. Sections 7301-7320).

Praxair requests the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

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IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See Section II.

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

SWALLOWING—This product is a gas at normal temperature and pressure.

SKIN ABSORPTION—No evidence of adverse effects from available information.

INHALATION—Asphyxiant. Moderate concentrations may cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting and unconsciousness. Lack of oxygen can cause death.

SKIN CONTACT—No harmful effect expected from vapor. Liquid may cause frostbite.

EYE CONTACT—No harmful effect expected from vapor.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No evidence of adverse effects from available information.

OTHER EFFECTS OF OVEREXPOSURE: Contact with liquid may cause frostbite.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: The toxicology and the physical and chemical properties of the material do not suggest that overexposure is likely to aggravate existing medical conditions.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None currently known.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING—This product is a gas at normal temperature and pressure.

SKIN CONTACT—For exposure to liquid, immediately warm frostbite area with warm water (not to exceed 105°F). In case of massive exposure, remove clothing while showering with warm water. Call a physician.

INHALATION—Remove to fresh air. Give artificial respiration if not breathing. Give oxygen if breathing is difficult. Call a physician.

EYE CONTACT—In case of splash contamination, immediately flush eyes thoroughly with water for at least 15 minutes. See a physician, preferably an ophthalmologist, immediately.

NOTE TO PHYSICIAN: There is no specific antidote. Treatment should be directed at the control of symptoms and the clinical condition.

NOTE: Suitability for use as a component in underwater breathing gas mixtures is to be determined by or under the supervision of personnel experienced in the use of underwater breathing gas mixtures and familiar with the effects, methods, frequency and duration of use, hazards, side effects and precautions to be taken.

V. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Not applicable	**AUTOIGNITION TEMPERATURE**	Not applicable
FLAMMABLE LIMITS IN AIR, % by volume	**LOWER** Not applicable	**UPPER**	Not applicable

EXTINGUISHING MEDIA: Nitrogen cannot catch fire. Use media appropriate for surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate all personnel from danger area. Immediately deluge containers with water spray from maximum distance until cool, then move containers away from fire area if without risk.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Gas cannot catch fire. Container may rupture due to heat of fire. No part of a container should be subjected to a temperature higher than 52°C (approximately 125°F). Most containers are designed to vent contents when they are exposed to elevated temperature.

VI. REACTIVITY DATA

STABILITY	
UNSTABLE	STABLE
	X

CONDITIONS TO AVOID: See Section IX.

INCOMPATIBILITY (materials to avoid): Under certain conditions, nitrogen can react violently with lithium, neodymium, titanium, ozone.

HAZARDOUS DECOMPOSITION PRODUCTS: None.

HAZARDOUS POLYMERIZATION	
May Occur	Will not Occur
	X

CONDITIONS TO AVOID: None currently known.

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Shut off leak if without risk. Ventilate area of leak or move leaking container to well-ventilated area. Test area, especially confined areas, for sufficient oxygen content prior to permitting re-entry of personnel.

WASTE DISPOSAL METHOD: Slowly release into atmosphere. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type): None required under normal use. However, air supplied respirators are required while working in confined spaces with this product. The respiratory protection use must conform with OSHA rules as specified in 29 CFR 1910.134.

VENTILATION	**LOCAL EXHAUST**—Use local exhaust system, if necessary, to prevent the build up of an oxygen deficient atmosphere.
	MECHANICAL (general)—Acceptable
	SPECIAL—None
	OTHER—None

PROTECTIVE GLOVES: Preferred for cylinder handling.

EYE PROTECTION: Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

IX. SPECIAL PRECAUTIONS

CAUTION: High pressure gas. Use piping and equipment adequately designed to withstand pressures to be encountered. Can cause rapid suffocation due to oxygen deficiency. Store and use with adequate ventilation. Close valve when not in use and when empty.

MIXTURES: When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death. Be sure to read and understand all labels and other instructions supplied with all containers of this product. For safety information of general handling of compressed gas cylinders, it is recommended that a copy of pamphlet P-1, "Safe Handling of Compressed Gas in Containers," be obtained from the Compressed Gas Association, Inc., 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202.

OTHER HANDLING AND STORAGE CONDITIONS: Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, then repair the leak.

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UCISCO

A PRAXAIR SERVICE COMPANY

SAFETY PRECAUTIONS FOR NITROGEN

Nitrogen is a stable, colorless, odorless gas. Nitrogen makes up about 78 percent of the atmosphere.

WARNING

Nitrogen can cause rapid asphyxiation and death if released in confined, poorly ventilated areas.

Nitrogen as a liquid or a cold gas may cause severe frostbite to the skin or eyes. Do not touch pipes or valves with the bare skin.

Use a pressure-reducing regulator when withdrawing gaseous nitrogen from a cylinder or other high-pressure source.

KEEP EQUIPMENT AREA WELL VENTILATED

Nitrogen is non-toxic, but it can cause rapid asphyxiation in a confined area without adequate ventilation by diluting the oxygen concentration in the air to dangerously low levels. Nitrogen may replace normal air without warning that a non-life supporting atmosphere is developing. Liquid product is of special concern, because a small amount of liquid evaporates to create a large amount of gas. Because nitrogen is colorless, odorless and tasteless, it cannot be detected by the human senses. Any atmosphere which does not contain enough oxygen can cause dizziness, unconsciousness, or even death. OSHA regulations define an oxygen deficient atmosphere as one with an oxygen concentration of less than 19.5 percent.

Never enter any tank, pit other confined area where these gases may be present until it has been purged with air and tested for a breathable atmosphere using a gas analyzer with a 0 to 25% scale. The oxygen content must be between 19.5 and 22 percent. Before entering any equipment that uses nitrogen, be sure all pipes, hoses, or ducts between it and the nitrogen source have been disconnected, blanked or otherwise positively closed off. Closing the valve is NOT a sufficient safety precaution. Monitor the oxygen content of the atmosphere as long as people are in the enclosed space. Persons working in confined spaces must be tethered with lifelines, and an observer must be stationed outside the entrance to continuously monitor their reactions. For further advise on confined space entry, obtain a copy of NIOSH publication 87-113, published by the U.S. Department of Health and Human Services.

NOTICE: Make certain that the information on this handout reaches each person who may use or come in contact with the product described on this sheet. This product is for use by trained personnel only. Additional copies of this handout are available from your UCISCO representative. Additional safety publications are listed on page 3 of this pamphlet.

AVOID CONTACT WITH LIQUEFIED GASES

Boiling always occurs when a warm container is filled or ambient temperature objects are placed in the liquid. Stand clear of boiling or splashing liquid and wear proper protective clothing. Never touch uninsulated pipes or vessels containing liquid nitrogen or the cold gas issuing from it. Both can cause severe frostbite, and the skin may adhere to the cold surface. Use tongs to lift objects in and out of the liquid nitrogen.

PROTECT EYES AND SKIN

Liquid nitrogen can be extremely cold. About -290 degrees Fahrenheit. Accidental contact with the liquid, or the cold gas issuing from it, may cause severe frostbite to the eyes or skin. Protect your eyes with safety goggles or face shield. Safety glasses without side shields do not give adequate protection. Cover the skin to prevent contact with the liquid or cold gas, or with cold pipes and equipment. Always wear gloves when handling anything that is, or may have been, in contact with the liquid. Special gloves made for cryogenic work are recommended, but leather gloves, without gauntlet that can be quickly and easily removed, may also be used. Long sleeves are recommended for arm protection. Wear cuffless trousers outside boots or over high top shoes to shed spilled liquid.

NEVER USE CONTAINERS, EQUIPMENT, OR REPLACEMENT PARTS OTHER THAN THOSE SPECIFICALLY DESIGNATED FOR USE IN NITROGEN SERVICE.

Be sure all containers, valves, regulators, hoses, etc. are designed for the intended use.

When handling liquid nitrogen, use only containers specifically designed for holding cryogenic liquids. Such containers are made from materials which can withstand the rapid changes and extreme differences in temperature that result. Even these special containers should be filled slowly to minimize the thermal shock. All such containers should be open or protected by a vent or other relief device which permits the vapors to escape without causing a rise in pressure. Inspect vents regularly to be sure that they are not plugged with ice condensed out of the air. Restricted vents can cause pressure build up which could damage or rupture the container.

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Griffith, Indiana 46319
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Two Summit Park Drive
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(216) 573-3627

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P.O. Box 1370
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Burlington, New Jersey 08016
(609) 386-4466

INSTITUTE
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P.O. Box 730
Institute, West Virginia 25112
(304) 768-7820

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P.O. Box 306
Magna, Utah 84044
(801) 250-0367

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9020 24th Street
Edmonton, Alberta
Canada T6P 1X8
(403) 467-9000

REFERENCE MATERIAL

MATERIAL SAFETY DATA SHEETS

L-4630-E [E-4630-D In Canada] ..... Liquid Nitrogen
L-4631-D [E-4631-C In Canada] ..... Gaseous Nitrogen

LINDE SAFETY PUBLICATIONS AND GUIDELINES

L-14-033 ..... Guidelines for Design and Installation of Industrial Gaseous Nitrogen and Argon Distribution Piping Systems.

COMPRESSED GAS ASSOCIATION (CGA) PUBLICATIONS

P-1 ..... Safe Handling of Compressed Gases in Containers
P-9 ..... The Inert Gases, Argon, Nitrogen, and Helium
P-12 ..... Safe Handling of Cryogenic Liquids
P-14 ..... Accident Prevention on Oxygen Rich and Oxygen Deficient Atmospheres
SB-2 ..... Oxygen Deficient Atmospheres

FEDERAL INFORMATION SOURCE

Federal Information Source
U.S. Department of Commerce
Springfield, VA 22161

NIOSH 87-113 ..... Confined Space Entry (U.S. Department of Health and Human Services)

EMERGENCY ASSISTANCE

If an emergency arises with a LINDE gas product in the United States, Call:
PRAXAIR Hazardous Materials
Emergency Line
800-645-4633
or
Chemical Transportation Emergency Center (CHEMTREC)
800-424-9300

IN CANADA, CALL THE CANADIAN HELP HOTLINE:
(514) 640-6400

All numbers can be called 24 hours a day.

The information on this sheet has been extracted from Linde Form L-3499

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NITROGEN, SAFETY PRECAUTIONS

USE PROPER PRESSURE REGULATORS

Prior to attaching a nitrogen regulator, inspect the regulator very carefully for physical damage or contamination and to ensure that it is properly sized and has the correct pressure rating for the intended service. Never use a damaged regulator.

Before attaching the regulator to withdraw gaseous nitrogen product, crack open the nitrogen supply valve for a moment to blow out any dust or dirt that might have accumulated in the nitrogen valve outlet. Connect the regulator to the valve and back out the pressure adjusting screw until it turns freely. While standing to one side of the regulator, open the nitrogen supply valve very slightly and very slowly to allow the gauge to move up to nitrogen supply pressure. Then, open the nitrogen supply valve all the way.

EXERCISE CAUTION WHEN DISPOSING OF WASTE GAS OR LIQUID

Gaseous nitrogen should be released only in an open outdoor area. Liquid nitrogen should be discharged into a remote, outdoor, gravel filled pit where it will evaporate safely.

FIRST AID

If symptoms of asphyxia such as headache, drowsiness, dizziness, excitation, excess salivation, vomiting, or unconsciousness are observed, remove the victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Call a physician promptly.

If exposure to cryogenic liquids or cold gases occurs, restore tissue to normal body temperature (98.6 degrees F) as rapidly as possible, then protect the injured tissue from further damage and infection. Call a physician immediately. Rapid warming of the affected part is best achieved by bathing it in warm water. The water temperature should not exceed 105 degrees F, and under no circumstances should the frozen part be rubbed, either before or after rewarming. If the eyes are involved, flush them thoroughly with warm water for at least 15 minutes. In case of massive exposure, remove clothing while showering with warm water. The patient should not drink alcohol or smoke. Keep warm and at rest. Call a physician promptly.

Refer to the Material Safety Data Sheets, L-4630 Liquid Nitrogen or L-4631 Gaseous Nitrogen, for detailed descriptions of the symptoms of overexposure and the first aid to be used.

PIPING SYSTEMS

Working safely with nitrogen requires safe piping systems, proper control equipment, and safe handling of any containers involved. The purpose of this handout is not to discuss cylinder handling or the design of distribution systems. However, a few of the major safety considerations are given below.

Never install equipment or piping for liquid nitrogen or the cold vapors issuing from it, without consulting someone thoroughly experienced in low temperature work. Piping must be of a material suitable for the type, pressure, and temperature of the gas being handled. Remember, certain materials (e.g., carbon steels) lose ductility and impact strength at cryogenic temperatures, and for many systems such exposure is possible.

Linde provides booklet L-14-033, Guidelines for the Design and Installation of Industrial Gaseous Nitrogen / Argon Distribution Piping Systems to assist you with the design and installation of piping systems.

When installing a piping system, you should observe standards published by the National Fire Protection Association. Mark piping in accordance with American National Standards Institute A 13.1, "Scheme for the Identification of Piping Systems," and label all piping with the name of the gas being carried. You should obtain a copy of the appropriate brochures and be sure that your system meets the recommended standards.

A suitable pressure relief device must be installed between each pair of shut off valves for all systems handling liquefied or cold nitrogen. Liquefied or cold nitrogen expands as it warms, and, if trapped between two valves, the expanding gas could create a very high pressure and cause piping or control equipment to rupture explosively.

When withdrawing gaseous product from a portable cryogenic liquid container with an integral vaporization coil, do not exceed the manufacturer's recommended withdrawal rates for the container. Excessive gas withdrawal rates may result in discharge of liquid or cold gas which can damage equipment into which the product is flowing.

IMPORTANT

Nitrogen has properties that can cause serious accidents, injuries, and even death if proper precautions and safety practices are not followed. Therefore, during handling and use of nitrogen, or during the operation and maintenance of equipment and systems using nitrogen, be certain to follow the applicable safety precautions described in this handout and in the Material Safety Data Sheets, safety standards, and other literature referenced in this handout. Manufacturer's operating instructions for equipment using nitrogen are to be followed exactly.